46 Avenue Road,
NW8 6HS

Basement Impact Assessment
Audit

For

London Borough of Camden

Project Number: 12466-83
Revision: D1

December 2017

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1.0 NON-TECHNICAL SUMMARY

1.1. CampbellReith was instructed by London Borough of Camden, (LBC) to carry out an audit on the Basement Impact Assessment submitted as part of the Planning Submission documentation for 46 Avenue Road, NW8 6HS (planning reference 2017/1718/P). The basement is considered to fall within Category C as defined by the Terms of Reference.

1.2. The Audit reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development in accordance with LBC's policies and technical procedures.

1.3. CampbellReith was able to access LBC's Planning Portal and gain access to the latest revision of submitted documentation and reviewed it against an agreed audit check list.

1.4. The BIA and SSR have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications, other than the authors of the BIA not identifying suitable expertise in engineering geology (CGeol).

1.5. Screening and scoping should be revised to include all questions as set out in CPG4. Reference should be made to each question requiring scoping within the BIA and the mitigation methods proposed.

1.6. The BIA references more than one proposal. The BIA should be modified to refer to the current proposed scheme only.

1.7. The BIA has confirmed that the proposed basement will be founded within London Clay. Groundwater monitoring has indicated water may be encountered during basement construction.

1.8. An outline works programme is required.

1.9. A geotechnical interpretation should be provided that includes retaining wall parameters and ground bearing capacities adopted for the design.

1.10. Where possible foundation inspection pits should be undertaken on any party walls to determine the presence of foundations.

1.11. The BIA is required to be submitted in a coherent document clearly addressing the scheme and the format described in CPG4 in order that the GMA can be audited.

1.12. The subsequent damage assessment in the GMA appears only to consider vertical ground movements. It should be confirmed that horizontal movements have been taken into account and shown how that is the case.

1.13. The impact of underpinning on the neighbouring properties should also be considered.

1.14. It should be confirmed if the footprint of the proposed basement encroaches on tree protection orders on trees in adjacent properties.

1.15. The potential for the London Clay to be susceptible to shrink swell should be picked up by screening and carried forward to scoping.

1.16. It should be confirmed whether the GMA assumes the presence of basements or not.

1.17. Preliminary calculations for the retaining walls or sides should be provided. All assumptions with respect to soil parameters, groundwater and surcharges should be clearly stated.

1.18. Control of water during construction should also be commented on.

1.19. The BIA advises the development proposal will not increase the impermeable areas of the site at surface level from the current situation and that a change to water flow crossing the site boundaries is negligible. This is accepted.

1.20. Temporary works proposals, scheme, drawings and associated mitigation measures being considered should be provided given the proposal. A temporary works method statement, scheme, layout and drawings should be provided and is currently not detailed on the proposed work sequence.

1.21. Details of monitoring during construction should be provided with the final scheme agreed as part of the party wall agreements.

1.22. Queries and requests for clarification are described in Section 4 and summarised in Appendix 2.

2.0 INTRODUCTION

2.1. CampbellReith was instructed by London Borough of Camden (LBC) on 15 June 2017 to carry out a Category C Audit on the Basement Impact Assessment (BIA) submitted as part of the Planning Submission documentation for 46 Avenue Road, NW8 6HS. Initial comments were sent highlighting the deficiencies in the submitted information and the audit was commenced in December 2017 once a further suite of documents had been uploaded to the planning portal.

2.2. The Audit was carried out in accordance with the Terms of Reference set by LBC. It reviewed the Basement Impact Assessment for potential impact on land stability and local ground and surface water conditions arising from basement development.

2.3. A BIA is required for all planning applications with basements in Camden in general accordance with policies and technical procedures contained within

- Guidance for Subterranean Development (GSD). Issue 01. November 2010. Ove Arup & Partners.
- Camden Planning Guidance (CPG) 4: Basements and Lightwells.
- Camden Development Policy (DP) 27: Basements and Lightwells.
- Camden Development Policy (DP) 23: Water.
- Local Plan adopted June 2017

2.4. The BIA should demonstrate that schemes:

a) maintain the structural stability of the building and neighbouring properties;

b) avoid adversely affecting drainage and run off or causing other damage to the water environment;

c) avoid cumulative impacts upon structural stability or the water environment in the local area, and;

evaluate the impacts of the proposed basement considering the issues of hydrology, hydrogeology and land stability via the process described by the GSD and to make recommendations for the detailed design.

2.5. LBC's Audit Instruction described the planning proposal as *"Demolition of existing building and erection of replacement dwelling house behind retained facade; excavation of basement level with front and rear lightwells; erection of replacement summerhouse"*

2.6. Planning was previously granted in January 2015 (2014/6395/P) – *"Excavation to extend existing single storey basement below footprint of dwelling house and part rear garden, including two front lightwells and two rear lightwells, demolition of existing outbuilding and erection of single storey ground floor outbuilding in rear garden."*

2.7. The Audit Instruction also confirmed 46 Avenue Road does not involve, or neighbour, listed buildings.

2.8. CampbellReith accessed LBC's Planning Portal on 06 December 2017 and gained access to the following relevant documents for audit purposes:

- Note on Work carried out in 2011 and 2014 and used for Planning Submission in 2017 by Edge Structures dated March 2017
- Executive Summary by Edge Structures dated March 2017
- Non-Technical Summary of the BIA by RKD Consultant Ltd, March 2014
- Basement Impact Assessment Report (BIA) Rev 06 by RKD Consultant Ltd dated September 2017
- Site Investigation Report by Concept dated August 2011
- PD-21 AIA, Arboricultural Report by Tim Moya Associates dated February 2017
- Planning Application Drawings consisting of

  Edge Structures drawings:

  005 P5 Site Permeability Schematic dated September 2017

  006 P5 Site Permeability Schematic proposed section C-C dated September 2017

  011 P6 Proposed Work Sequence for Basement Construction Sheet 1 dated September 2017

  012 P6 Proposed Work Sequence for Basement Construction sheet 2 dated September 2017

  013 P7 Proposed Work Sequence for Basement Construction Sheet 3 dated September 2017

  014 P6 Proposed Work Sequence for Basement Construction Sheet 4 dated September 2017

  015 P7 Proposed Work Sequence for Basement Construction Sheet 5 dated September 2017

  016 P7 Proposed Work Sequence for Basement Construction Sheet 6 dated September 2017

  099 P5 Structural Proposals Basement dated September 2017

  100 P5 Structural Proposals Ground Floor dated September 2017

  201 P4 Structural Proposals Sections A and B dated September 2017

  203 P2 Structural Proposals Section D-D dated September 2017

  BB Partnership drawings:

FQM 100 Rev A Site Location Plan dated April 2014

FQM 101 Rev A Existing Site Plan dated April 2013

FQM 102 Rev A Existing Plans dated April 2013

FQM 103 Rev A Existing Sections/Elevations dated April 2013

FQM 104 Rev D Proposed Ground & Basement Plan dated April 2013 with note *'Amended Basement GIA Based on Local Plan A5 Basements Policy'* dated November 2017

FQM 106-109 Rev D Proposed Sections and Elevations dated November 2017

- Planning Comments and Responses

2.9. A structural Method Statement by Edge Structures, dated 9th March 2017, Rev F, has also been used however we note the drawings included in the appendix and the scheme described in Section 4 have been superseded by those shown in the Edge Structures drawings above.

3.0 BASEMENT IMPACT ASSESSMENT AUDIT CHECK LIST

Item	Yes/No/NA	Comment
Are BIA Author(s) credentials satisfactory?	No	Further information required. See section 4.2. Evidence of relevant experience is also not demonstrated.
Is data required by Cl.233 of the GSD presented?	No	Further information required. Refer to section 4.5 and 4.9.
Does the description of the proposed development include all aspects of temporary and permanent works which might impact upon geology, hydrogeology and hydrology?	No	Further information required. Refer to section 4.10.
Are suitable plan/maps included?	Yes	
Do the plans/maps show the whole of the relevant area of study and do they show it in sufficient detail?	No	
Land Stability Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	Further information required. See section 4.12.
Hydrogeology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	As above.
Hydrology Screening: Have appropriate data sources been consulted? Is justification provided for 'No' answers?	No	As above.
Is a conceptual model presented?	Yes	
Land Stability Scoping Provided? Is scoping consistent with screening outcome?	No	Further information required. See section 4.13 - 4.22.

Item	Yes/No/NA	Comment
Hydrogeology Scoping Provided? Is scoping consistent with screening outcome?	No	Further information required. See section 4.12 and 4.24.
Hydrology Scoping Provided? Is scoping consistent with screening outcome?	No	Further information required. See section 4.12.
Is factual ground investigation data provided?	Yes	
Is monitoring data presented?	Yes	
Is the ground investigation informed by a desk study?	Yes	The BIA indicates the ground investigation is informed by a desk study.
Has a site walkover been undertaken?	Yes	
Is the presence/absence of adjacent or nearby basements confirmed?	No	Further information required. See section 4.18.
Is a geotechnical interpretation presented?	No	Further information required. See section 4.10.
Does the geotechnical interpretation include information on retaining wall design?	No	Further information required. See section 4.10.
Are reports on other investigations required by screening and scoping presented?	No	To be confirmed once screening and scoping have been completed.
Are the baseline conditions described, based on the GSD?	Yes	However a basement cannot be assumed to be next door unless verified.
Do the base line conditions consider adjacent or nearby basements?	No	Basements in adjacent properties should be confirmed.
Is an Impact Assessment provided?	Yes	
Are estimates of ground movement and structural impact presented?	Yes	Queries raised with respect to the GMA are located in section 4.14 – 4.19.

Item	Yes/No/NA	Comment
Is the Impact Assessment appropriate to the matters identified by screen and scoping?	No	To be confirmed once screening and scoping are completed.
Has the need for mitigation been considered and are appropriate mitigation methods incorporated in the scheme?	No	Cannot be confirmed without full screening and scoping assessment.
Has the need for monitoring during construction been considered?	No	As above.
Have the residual (after mitigation) impacts been clearly identified?	No	As above.
Has the scheme demonstrated that the structural stability of the building and neighbouring properties and infrastructure will be maintained?	No	As above.
Has the scheme avoided adversely affecting drainage and run-off or causing other damage to the water environment?	Yes	Although this is to be confirmed when full screening and scoping are submitted.
Has the scheme avoided cumulative impacts upon structural stability or the water environment in the local area?	No	Cannot be confirmed.
Does report state that damage to surrounding buildings will be no worse than Burland Category 1?	No	Cannot be confirmed.
Are non-technical summaries provided?	Yes	To be updated once the above are addressed.

4.0 DISCUSSION

4.1. The Basement Impact Assessment (BIA) has been carried out by RKD Consultant Ltd (RKD) with a separate non-technical summary of each BIA stage. The BIA includes a Ground Investigation (GI) prepared by Concept Consultants. A Structural Method Statement and drawings have been prepared by Edge Structures Ltd (ES) and proposed development drawings prepared by BB Partnership Ltd (BBP).

4.2. The qualifications of the author of the BIA and the associated reports are in compliance with the requirements of CPG4 except for a hydrogeologist with a 'CGeol' (Chartered Geologist) qualification from the Geological Society of London.

4.3. 46 Avenue Road is an existing four storey building with a partial basement under half the northern side of the building. A forecourt comprising hard standing with a basement car park lift is located to the front of the property adjacent to Avenue Road. A garden is located to the rear of the property with a single storey summer house. It is noted that a swimming pool was previously present in the rear garden.

4.4. The site is located in a residential area with No. 44 Avenue Road to the south east and No. 48 to the north west.

4.5. Conflicting information has been provided with respect to the proposed development. For example the BIA describes a summer house with a spiral staircase to a two storey basement but the latest proposals described in the BBP and ES drawings do not show this proposal. The description of the proposed development in the BIA should be modified to current proposals before the BIA can be fully audited.

4.6. The drawings provided by ES construction dated September 2017 and the proposed development drawings from BBP 'FQM', Rev D dated November 2017 show a similar scheme and the remainder of this audit has been undertaken on this basis.

4.7. The proposed development includes the retention of the front elevation to the existing property, demolition of the house behind, new accommodation being provided at basement level and a 3 storey house above. Beneath the original house, a single storey basement with two new basement light wells at the front will be constructed. The underside of the proposed basement floor is approximately 3.7m below ground level. To the rear of the house, a single storey basement with services void underneath to accommodate a swimming pool, changing room facilities, pool plant equipment and access to the house is to be constructed with the proposed basement floor approximately 7.3m below ground level.

4.8. It is proposed that the wall to the basement will be formed by piles except in the area of the existing basement where the existing walls will be underpinned using a traditional approach. Reinforced concrete floors at basement and ground level will create an enclosed box. The Structural Method Statement proposes that 'the walls will be propped at ground level but this is to be confirmed by a specialist ground works contractor'.

4.9. For a project of this scale a programme of works is required.

4.10. A ground investigation undertaken by Concept Consultants in July 2017 comprised 3 No. cable percussive holes to a depth of 25m bgl. The investigation identified Made Ground up to 1.10m bgl with London Clay to the base of the boreholes. The BIA confirms that a ground water seepage was encountered in the rear garden in the Made Ground. No other water strikes were encountered. During monitoring groundwater was at 7.10m bgl in BH01 and at 4.75m bgl in BH03 after 14 days. Groundwater was monitored in BH02 at 0.55m bgl after 14 days and was attributed to perched water in the Made Ground filling the standpipe. A geotechnical interpretation should be provided that includes retaining wall parameters and ground bearing capacities adopted for the design.

4.11. Where possible foundation inspection pits should be undertaken on any party walls to determine the presence of foundations.

4.12. A summary of screening outcomes is provided in the non-technical summary by RKD dated March 2017, however screening questions should be listed and answered as per Figure 4 - 6 of Section 3 of the CPG4 July 2015 guidance in order to allow the outcomes to be audited. Scoping is described in the non-technical summary provided by RKD, March 2017 but cannot be validated until the screening exercise has been presented.

4.13. We note for land stability, the non-technical summary identifies slopes are no more than 3.6°. The summary also identifies adjacent properties as having higher foundations and notes that the impact of the whole basement installation work needs to be considered carefully with respect to these buildings.

4.14. A Ground Movement Assessment (GMA) is presented by RKD which refers to revision 4 of a BIA dated April 2014. It is noted that the scheme has been revised since that date. It is also noted that there are further revisions of the BIA on the planning portal including a Rev 05 prepared by ES and Rev 06 prepared by RKD. The BIA is required to be submitted in a coherent document clearly addressing the scheme and in the format described in CPG4 in order that the GMA can be audited.

4.15. The geometry of the basement is described in section 2.2 of the GMA, however, without levels clearly marked on supporting drawings it is not possible to confirm whether the assumptions

are correct. The GMA refers to contiguous piled walls whilst the other documentation and drawings show a secant wall inside a sheet piled wall. This should be clarified and made consistent across all documents.

4.16. We note that vertical ground movements associated with pile installation have been taken to be approximately half those that would be predicted using empirical methods (CIRIA C580, now superseded by CIRIA C760). It is accepted that actual movements can be less than previous case studies, provided there is particular attention paid to installation. It is reported that wall deflections due to excavation have been estimated using the retaining wall design software FREW by OASYS. Whilst we have not seen the input, we note that predicted horizontal ground movements are close to those that would be derived empirically from published data. Vertical ground movements have been predicted using a correlation given in CIRIA C580, which is accepted.

4.17. The subsequent damage assessment appears only to consider vertical ground movements. It should be confirmed that horizontal movements have been taken into account and shown how that is the case.

4.18. The ES Structural Method Statement identifies that it is not known if a basement exists beneath No. 44, and that a planning application (2012/3861/P) for a basement was submitted for No. 48. It cannot be assumed that the planning application resulted in the construction of a basement at No 48. It should be confirmed whether the GMA assumes the presence of basements or not.

4.19. The impact of underpinning on the neighbouring properties should also be considered.

4.20. Though it is not planned to fell any trees of significant height as part of the proposal, there are a number of tree protection orders (TPO) on trees located in adjacent properties. The aboricultural report highlights trees T6 and T7 as having TPOs and it should be confirmed whether the footprint of the proposed basement encroaches into the root zones. Though picked up in the aboricultural report this is not highlighted in the BIA and should be taken through to scoping.

4.21. The non-technical summary identified that London Clay is located near surface. The London Clay has the potential for shrink swell and considering the proximity of adjacent trees to the development proposal and neighbouring properties; this should be picked up in screening and carried through to scoping.

4.22. The Structural Method Statement contains a description of existing conditions and a description of the proposed works and access requirements with an outline construction methodology. No preliminary calculations for the retaining walls or sides have been provided and are required. All

assumptions with respect to soil parameters, groundwater and surcharges should be clearly stated.

4.23. For hydrogeology the proximity of the River Tyburn across Avenue road was identified as requiring specific attention. The ground investigation identified ground water within the Made Ground and London Clay as described above. The Structural Method Statement indicates that the basement will need to be designed to resist water pressures to CP101:1973. The lower slab will be restrained by tension piles to resist water uplift and an under slab system provided to deal with clay heave pressures.

4.24. Control of water during construction should also be commented on.

4.25. The BIA highlighted that Avenue Road is identified as a street at risk of flooding. The BIA describes a flood risk assessment has been undertaken. The FRA notes the site itself is at a slightly elevated level and not considered to be at risk from flooding.

4.26. The BIA also identifies that the proposed design includes a layer of granular fill to a depth of approximately 800mm over the basement. This will assist in attenuating peak runoff rates. This is shown in the ES site permeability drawings 005 and 006 dated November 2017.

4.27. The BIA advises the development proposal incorporating the granular fill in the rear garden will not increase the impermeable areas of the site at surface level from the current situation and that a change to water flow crossing the site boundaries is negligible. This is accepted.

4.28. Temporary works proposals and associated mitigation measures being considered should be provided given the scheme under consideration. A temporary works method statement, scheme, layout and drawings should be provided and is currently not detailed on the proposed work sequence.

4.29. Details of monitoring during construction should be provided with the final scheme agreed as part of the party wall agreements.

4.30. Given the number of queries raised it is recommended that the BIA and supporting documents are revised and resubmitted. A summary of open queries can be found in Appendix 2.

5.0 CONCLUSIONS

5.1. The BIA and SSR have been carried out by well-known firms of engineering consultants using individuals who possess suitable qualifications, other than the authors of the BIA not including a chartered geologist.

5.2. Screening and scoping should be revised to include all questions as set out in CPG4. Reference should be made to each question requiring scoping within the BIA and the mitigation methods proposed.

5.3. The BIA references more than one proposal. The BIA should be modified to refer to the current proposed scheme only.

5.4. The BIA has confirmed that the proposed basement will be founded within London Clay. Groundwater monitoring has indicated water may be encountered during basement construction. Proposals for dewatering should be presented.

5.5. An outline works programme is required.

5.6. A geotechnical interpretation should be provided that includes retaining wall parameters and ground bearing capacities adopted for the design.

5.7. Where possible foundation inspection pits should be undertaken on any party walls to determine the presence of foundations.

5.8. The BIA is required to be submitted in a coherent document clearly addressing the scheme and the format described in CPG4 in order that the GMA can be fully audited.

5.9. The subsequent damage assessment in the GMA appears only to consider vertical ground movements. It should be confirmed that horizontal movements have been taken into account and shown how that is the case. It should be confirmed whether the GMA assumes the presence of basements or not.

5.10. The impact of underpinning on the neighbouring properties should also be considered.

5.11. It should be confirmed if the footprint of the proposed basement encroaches on tree root zones in adjacent properties.

5.12. The potential for the London Clay to be susceptible to shrink swell should be picked up by screening and carried forward to scoping.

5.13. Preliminary calculations for the retaining walls or sides should be provided. All assumptions with respect to soil parameters, groundwater and surcharges should be clearly stated.

5.14. The BIA advises the development proposal will not increase the impermeable areas of the site at surface level from the current situation and that a change to water flow crossing the site boundaries is negligible. This is accepted.

5.15. Temporary works proposals, scheme, drawings and associated mitigation measures being considered should be provided given the proposal. A temporary works method statement, scheme, layout and drawings should be provided and is currently not detailed on the proposed work sequence.

5.16. Details of monitoring during construction should be provided with the final scheme agreed as part of the party wall agreements.

Appendix 1: Residents' Consultation Comments

Residents' Consultation Comments

Surname	Address	Date	Issue raised	Response
Solti	51 Elsworthy Road	24/05/17	Risk of flooding	Addressed. See section 2.29 - 4.32
Bagherzade	49 Elsworthy Road	28/05/17	Water level rising rear garden	As above.
Bach	2 Elseworth Terrace	25/05/17	Risk of flooding	As above.

Appendix 2: Audit Query Tracker

Audit Query Tracker

Query No	Subject	Query	Status	Date closed out
1	BIA	CGeol qualification for the screening and scoping of Subterranean (groundwater) flow.	Open	
2	BIA	BIA should be amended to describe the current proposal in a coherent document clearly addressing the scheme and in the format described in CPG4 in order that the GMA can be audited.	Open	
3	BIA	Programme of works not provided.	Open	
4	BIA	A geotechnical interpretation should be provided that includes retaining wall parameters and ground bearing capacities adopted for the design.	Open	
5	BIA	Screening questions should be listed and answered as per Figure 4 - 6 of Section 3 of the CPG4 July 2015 guidance.	Open	
6	BIA	Scoping cannot be validated until the screening exercise has been presented.	Open	
7	Stability	Refer to queries in section 4.12 – 4.22	Open	
11	Stability	It should be confirmed whether the footprint of the proposed basement encroaches into the TPO root zones.	Open	
12	Stability	The potential for the London clay to be subject to shrink swell should be highlighted and taken forward to scoping	Open	
13	Stability	Preliminary calculations for the retaining walls or sides are required. All assumptions with respect to soil parameters, groundwater and surcharges should be clearly stated.	Open	

14	Stability	Temporary works proposals and associated mitigation measures being considered should be provided given the proposal. A temporary works method statement, scheme, layout and drawings should be provided.	Open	
15	Stability	Details of monitoring during construction should be provided with the final scheme agreed as part of the party wall agreements.	Open	
16	Hydrogeology	Control of water during construction should also be commented on.	Open	

Appendix 3: Supplementary Supporting Documents

None